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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/040,646	01/07/2002	Hirohiko Nishiki	SLA 0452	2652
7590 11/06/2003			EXAMINER	
David C. Ripma Patent Counsel Sharp Laboratories of America, Inc. 5750 NW Pacific Rim Boulevard Camas, WA 98607			ALANKO, ANITA KAREN	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 11/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/040,646

Applicant(s)

NISHIKI ET AL.

Examiner

Anita K Alanko

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10/20/03 amendment.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 9-19 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 20-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Claim Rejections - 35 USC § 112

Claims 1-8 and 20-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "thin" in claims 1, 5 and 20, lines 7, 2 and 11 is a relative term that renders the metes and bounds of the claims unclear. It may be simply deleted.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Bergman (US 6,497,768 B2).

Bergman discloses a method comprising:

forming an electrode layer (since BEOL semiconductor workpieces inherently have electrodes; col.11, line10);

forming a resin residue overlying the substrate (organic contaminants such as photoresist, col.3, lines 1-3);

forming a sheet of water overlying the resin residue (col.8, line 61; col.9, lines 25-26);

blowing ozone gas into the sheet of water to create a moist ozone gas (col.9, lines 45-50);

and

wet ashing the resin residue overlying the first area of the electrode layer using the moist ozone gas (col.10, lines 1-12).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 8 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman (US 6,497,768 B2).

The discussion of Bergman from above is repeated here.

As to claim 2, Bergman discloses using a photoresist layer in intermediate fabrication steps for forming a device (col.14, lines 32-36), but Bergman does not explicitly disclose the steps of patterning the resin interlayer, forming a via to access the first area of the electrode layer, and forming a resin residue overlying a first area of the electrode layer in response to forming the via. However, examiner takes official notice that these are all conventional steps in the formation of devices such as semiconductors or liquid crystal displays (col.16, lines 18-21).

It would have been obvious to one with ordinary skill in the art to pattern, form the via and form the resin residue as cited in claim 2 in the method of Bergman because they are conventional steps for the formation of devices such as semiconductors or liquid crystal displays.

As to claim 3, Bergman does not disclose the thickness of the interlayer film of resin overlying the electrode. However, the thickness is a result effective variable since it determines

pattern formation in underlying layers. It would have been obvious to one with ordinary skill in the art to deposit to the thickness cited in the method of Bergman because the thickness appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claim 4, Bergman discloses to use moist ozone gas, but does not disclose the concentration. Since ozone is reacting, its concentration has an effect on the rate of reaction. Also since the same method steps are conducted in the modified method of Bergman, as in the instant invention, the same concentration is expected. It would have been obvious to one with ordinary skill in the art to use the concentration cited in order to optimize the process for best results since the concentration appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claim 5, Bergman discloses to heat the water to 95 °C (col.10, line 51), which is approximately 90 °C. Bergman also discloses ranges of 25-150 °C (col.10, lines 15), which overlaps with the range cited.

As to claim 8, Bergman discloses a higher ashing rate (col.10, lines 61-62) than that cited. The example of Bergman in col.10, lines 47-62, uses photoresist on a bare wafer; this photoresist has different etching properties of a photoresist that has been hardened during a via patterning process, as is well known by one with ordinary skill in the art. However, since the modified method of admitted prior art uses the same materials and method steps as the instant invention, the same ashing rate is expected.

As to claim 21, Bergman discloses to supply the water from underneath (col.7, lines 12-21), which inherently includes placing the electrode layer upside down.

As to claims 22-23, Bergman discloses to rotate including the range 800-1500 rpm (col.5, lines 1-7).

Claims 1-8 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Bergman (US 6,497,768 B2) and admitted prior art.

The discussion of Bergman from above is repeated here.

As to claims 3 and 20, admitted prior art teaches that pixel-on-passivation (POP) structures are known (page 1 of specification, lines 22+). Admitted prior art teaches that resin interlayers patterned by using a photoresist and etching (page 2, lines 1-10) are known and useful.

Admitted prior art fails to disclose to clean the vias before pixel electrode deposition. The modified method of Bergman discloses a useful cleaning process after a via etching process using photoresist. Bergman also discloses that the moist ozone cleaning process is useful when metal lines are exposed during the cleaning process (col.11, lines 24-27).

It would have been obvious to one with ordinary skill in the art to use the method of Bergman to clean a POP structure including resin interlayer because Bergman teaches that cleaning is useful for removing contaminants, which in turn increases the yield of the final product.

It would have been still further obvious to one with ordinary skill in the art to deposit the resin interlayer to the thickness cited because the thickness appears to reflect a result-effective variable which can be optimized. See MPEP 2144.05 IIB.

As to claims 6-7, admitted prior art teaches that pixel-on-passivation (POP) structures are known (page 1 of specification, lines 22+). Admitted prior art teaches that pixel electrodes of ITO or aluminum overlying molybdenum are also known (page 2, lines 21-23).

Response to Amendment

The rejections over DeGendt is withdrawn.

The claims are rejected under 35 U.S.C. 112, second paragraph.

Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Bergman (US 6,497,768 B2).

Claims 1-5, 8 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bergman (US 6,497,768 B2).

Claims 1-8 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Bergman (US 6,497,768 B2) and admitted prior art.

Response to Arguments

Applicant's arguments with respect to claims 1-8 and 20-23 have been considered but are moot in view of the new grounds of rejection.

The rejections over DeGendt are withdrawn because, while DeGendt discloses the formation of a sheet of water through which ozone diffuses to remove resin residue (paragraph [0084] discloses the formation of a thin condensation layer), DeGendt does not suggest to blow ozone to the sheet of water, as in the context of claim 1. Rather, DeGendt discloses to bubble ozone through the water that is below the wafer (Fig.3).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited art shows methods with blowing ozone into a layer of water for cleaning.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K Alanko whose telephone number is 703-305-7708. The examiner can normally be reached on Monday, Tuesday and Friday, 8:00 am-4:00 pm, and Tuesday and Wednesday, 10:00 am – 2:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 703-305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Anita K. Alanko
Anita K Alanko
Primary Examiner
Art Unit 1765